

# A world-first standard for CO<sub>2</sub> rebreathing risk in infant sleep products

## Standards Australia publishes AS 5407.3

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On 22nd May 2026, Standards Australia published AS 5407.3, *Methods of testing infant sleep surfaces, Method 3: Test for carbon dioxide and associated requirements*. It is the world's first national consumer-product standard for measuring carbon dioxide rebreathing risk in infant sleep products, and it is the second phase in a coordinated suite spearheaded by INPAA in association with a coalition of regulators, public health bodies, consumer advocates, bereaved-family organisations, and industry.

This work has taken time. The methodology underpinning AS 5407.3 was published in the peer-reviewed literature in 1998, and the institutional work to translate that science into a reproducible national standard has taken more than a generation. That time was not delay. It was the work itself: producing a standard that industry can implement, regulators can reference, and laboratories can reproduce.

This standard arrives at a moment when it is urgently needed. After three decades in which the Back to Sleep campaign drove a dramatic fall in sudden unexpected deaths in infancy, the decline has since levelled off. The dramatic gains of the 1990s have not been repeated.

AS 5407.3, in combination with AS 5407.1 and AS 5407.2 (firmness, June 2025) and the forthcoming product safety communication standard, could be the missing piece of the puzzle that will make a meaningful impact on the alarming statistics.

### The science was settled in 1998

The mechanical breathing model that underpins AS 5407.3 has its origins in work published by Carleton and colleagues in 1998 [1]. Their model simulated infant breathing through the nares of a weighted infant-sized doll at a controlled rate, with metered carbon dioxide simulating infant metabolism, and has been refined and replicated in the medical literature for more than 25 years.

The work that preceded it, by Kemp and colleagues in 1993, had already established that common bedding could cause lethal rebreathing in face-down infants [2].

By the early 2000s, Patel and colleagues had measured elevated inspired CO<sub>2</sub> in real sleeping infants on soft bedding [3], and Colditz and colleagues had confirmed the rebreathing potential of common infant mattresses and bedcovers [4], showing that the mechanical model translated to live physiology. Buchanan has since argued that impaired CO<sub>2</sub>-induced arousal may be a shared vulnerability mechanism in the infants most at risk [5]. The science was, and is, robust. It has been peer-reviewed, replicated, and internationally recognised by bodies including the American Academy of Pediatrics [6].

What did not exist, until now, was a product safety standard that took that science out of the laboratory and translated it into a reproducible test that industry could implement and regulators could reference. The 27-year gap between the methodology's publication and the

standard's release is a long time, but it is the time the work required. A robust, evidence-based, scientifically founded standard that is effective in implementation does not get built in months, and it should not be.

It requires:

- A consensus across industry, health, and consumer interests on what the test must measure and at what threshold.
- Technical refinement of the apparatus until results are reproducible across laboratories.
- The coalition assembled around the work to keep showing up across years of drafting, public consultation, and committee process.

None of that is incidental.

This is the difference between a published methodology and an enforceable world first national consumer-product standard, and that difference is what protects parents when they buy a product whose claim has been tested.

## **SUDI rates have plateaued**

The Back to Sleep campaign, beginning in the early 1990s, was the most successful public health intervention this category has seen. Parents were given a single, specific behavioural change, place baby on their back to sleep, and the rates of sudden unexpected death in infancy fell sharply and durably [8]. The subsequent expansion of safe sleep guidance, firm flat surface, clear cot, face uncovered, room-sharing for the first six to twelve months, smoke-free environment, built on that foundation and continued to drive improvements through the 1990s and into the 2000s.

That decline has since levelled off. The last decade has not seen the kind of reduction in SUDI rates that the 1990s delivered. The pattern of the data is consistent with what would be expected when a behavioural intervention has been broadly absorbed by its target population.

Parents in Australia today, by and large, place their babies on their backs. They use firm flat surfaces. They keep the cot clear. The guidance is reaching the people who need it, and it is being followed. What the data is telling us is that further improvement against this statistic will not come from repeating the messages that drove the original gains. It will come from acting at a different level of the system.

That different level is the product.

CO<sub>2</sub> rebreathing operates as a hazard at the interface between an infant and the surface their face contacts during sleep, and it is determined by the material properties of that surface. A baby placed correctly, on a firm flat surface, in a clear cot, can still rebreathe exhaled air if the surface beneath them traps it.

A product-level hazard can only be addressed with a product-level intervention.

## **The three-phase suite: mattress firmness, CO<sub>2</sub> rebreathing, and product safety communication**

AS 5407.3 is the second phase of a three-phase suite. Each phase addresses a different product-level hazard, and the three were designed to work together.

## Phase 1: Mattress firmness

Australia introduced the world's first national mattress firmness standard in 2013 [8]. AS 5407.1 and AS 5407.2, published in June 2025, brought that work up to date and extended its scope across a wider range of products [9]. The principle is straightforward: a firm sleep surface keeps a baby's airway clear and prevents the kind of sinking that lets bedding occlude the face.

## Phase 2: CO<sub>2</sub> rebreathing

AS 5407.3 establishes that even where a surface meets firmness requirements, it does not trap exhaled air around the baby's face, a hazard recently confirmed as separable from firmness in research by Barker and colleagues [10]. The test uses a mechanical breathing model that simulates a two-to-six-month-old infant, with a 9% CO<sub>2</sub> pass/fail threshold — more than double the level of normal exhaled breath. Critically, the standard tests products in the combinations parents actually use them in: a mattress with a sheet over it, a mattress with a protector, layered products as they appear in real cots. Some combinations behave very differently from their individual components, and the standard captures that.

## Phase 3: Product safety communication

The product safety communication standard will close the gap between what safe sleep science requires and how products are labelled, advertised, and presented to parents. A product can pass phase one and phase two and still be marketed in ways that contradict safe sleep practice. Phase three addresses that.

Each phase is necessary. None is sufficient on its own. A product can be firm and still trap CO<sub>2</sub>. A product can pass CO<sub>2</sub> testing and still be communicated to parents in ways that mislead. The three-phase architecture exists because the hazards are independent and the protections must be too.

The AS 5407 suite is voluntary technical infrastructure. It is the measurement layer of the system, not the legal layer. Mandatory force comes through Australian Consumer Law, where instruments made by the ACCC can reference voluntary standards and convert their measurements into requirements suppliers must meet.

Two such instruments are already in force from 19 January 2026: the **Consumer Goods (Infant Sleep Products) Safety Standard 2024** [11], which governs the physical product, and the **Consumer Goods (Infant Products) Information Standard 2024** [12], which governs what must be communicated on labels, packaging, and product listings. The Safety Standard already references Australia's 2013 firmness standard, and is expected to reference the updated AS 5407 suite in future regulatory updates as each phase becomes available.

This is the world-first achievement. Other countries have addressed elements of infant sleep product safety through various mechanisms. No other country has built a coordinated three-phase technical suite alongside the mandatory consumer law architecture designed to reference it.

## Australian leadership, built on collaboration

Australian industry didn't wait to be regulated. INPAA, in its role as the peak industry body for infant and nursery products in Australia, convened and drove the development of the suite voluntarily, through a formal Standards Australia process. Industry brought this work to the table because safety is the category's priority.

That leadership has not been confined to standards development. Manufacturers across the category have been implementing the underlying science into their products, updating product language, commissioning independent testing, while the standards themselves were still in development. The science was settled. Responsible manufacturers didn't wait to act on it.

Industry built the coalition that delivered the suite. Regulators, public health bodies, consumer advocates, retailers, and accredited test laboratories joined the work at industry's invitation, and each constituency brought distinct expertise the standard needed.

The model works because it brings everyone to the table early, before regulation rather than after it. By the time AS 5407.3 becomes available for the ACCC to reference under the Australian Consumer Law, it has already been technically tested, practically scrutinised, and consensus-supported by the parties who will need to implement it. That is how good safety regulation gets built in a mature economy.

## Retiring "breathable"

A standard is only as effective as the communication that surrounds it. Publication is the technical milestone. The rollout to parents, the part that determines whether AS 5407.3 actually changes what babies sleep on, is the communication work, and it belongs to industry now.

The word "breathable" needs to be retired from infant sleep product marketing. Not banned, not punished. Retired. It was previously used in good faith by brands who genuinely cared about infant safety, in a market where there was no agreed scientific framework to replace it with [13]. The science has now caught up, and there is a reproducible test that measures what "safe to breathe against" actually means, and what it doesn't. With that measurement comes an obligation on industry to update the language it uses.

The more accurate language is straightforward:

- "Tested to AS 5407.3"
- "Tested for CO<sub>2</sub> rebreathing risk"
- "Meets the Australian standard for CO<sub>2</sub> rebreathing"
- "Designed to help reduce rebreathing risk," paired with a testing claim

These phrases have anchors. They point to a specific document, a specific 9% threshold, a specific test methodology. A retailer can be asked to produce the test report. A regulator can audit the claim. A consumer protection body can act if it is misused. That is the difference between a marketing word and a verifiable safety claim, and it is the difference parents are entitled to.

The new question parents should ask any brand selling an infant sleep product is this: ***Does this product help reduce the risk of rebreathing, and has it been tested?***

It asks about the actual safety outcome, reducing rebreathing risk, and it asks for verification. The shift in burden of proof is the whole point. Brands that have done the work will welcome the question. Brands that haven't will need to.

## What hasn't changed, and what comes next

The foundation of safe sleep practice has not changed and will not change. The standards support those messages. They do not replace them.

What AS 5407.3 does is open a level of intervention the system has not previously been able to act on. The product-level hazard of CO<sub>2</sub> rebreathing is now measurable, testable, and addressable through standards that industry can implement, regulators can reference, and parents can ask retailers about.

Phase three of the suite, on product safety communication, is in development and is expected later this year. No single standard will reverse a plateau on its own. The data will tell us, in time, what impact this generation of standards has been able to achieve. What can be said today is that Australia is leading the world when it comes to infant product safety innovation and the real winners are Australian families.

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